SUPPORT FOR THE AMENDMENTS

This Amendment cancels Claim 4; and amends Claim 1. Support for the amendments is found in the specification and claims as originally filed. In particular, support for Claim 1 is found in canceled Claim 4 and in the specification at least at page 6, lines 26-27. No new matter would be introduced by entry of these amendments.

Upon entry of these amendments, Claims 1-3 and 5-20 will be pending in this application. Claim 1 is independent.

REQUEST FOR RECONSIDERATION

Applicants respectfully request entry of the foregoing and reexamination and reconsideration of the application, as amended, in light of the remarks that follow.

The present invention relates to a silica slurry that can be used for polishing semiconductor materials. To obtain polishing accuracy and speed, it is necessary that silica powder be well dispersed in the slurry, that the slurry have low viscosity, and that the slurry viscosity exhibit stability with the passage of time even for high silica concentrations. See, specification at page 2, lines 10-13.

In conventional silica dispersion slurries, the silica concentration is limited to less than about 40%. If the silica concentration is more than 40%, slurry flowability is easily lost and viscosity stability with the passage of time is low. This is particularly a problem with slurries containing fine silica powder, e.g., fumed silica having an average primary particle size of from 7 to 50 nm. Agglomeration of fine silica powder frequently occurs, which results in a particle size at the time of polishing that is not uniform, and a viscosity change with the passage of time that is large. Specification at page 2, lines 14-22.

In contrast, the present invention provides a silica slurry having a low viscosity of less than 1000 mPa•s even for a silica concentration of more than 50% by weight. Furthermore,

the silica slurry of the present invention exhibits little viscosity change with the passage of time. These slurry characteristics are achieved by using a silica powder in which (i) the average primary particle size (DT) is in a range of from 0.08μm to 0.8μm and (ii) the ratio (DL/DT) of the average particle size (DL) and the average primary particle size (DT) is less than 1.3. Specification at page 8, line 27 to page 9, line 6. The ratio (DL/DT) reflects the agglomeration of particles. Specification at page 5, lines 26-27.

In the field of semiconductor polishing, a slurry using colloidal silica has good dispersibility and stability, but low purity. In contrast, a slurry using fumed silica has high purity, but poor dispersibility and stability. The high concentration silica slurry of the present invention combines high purity with good dispersibility and stability.

Claims 1 and 4-6 are rejected under 35 U.S.C. § 103(a) over U.S. Patent Application Publ. No. US 2003/0103814 ("Greenwood-814"). Claims 1-20 are rejected under 35 U.S.C. § 103(a) over U.S. Patent Application Publ. No. US 2004/0077768 ("Greenwood-768") alone or in view of U.S. Patent No. 4,588,421 ("Payne"). Claims 1 and 3-6 are rejected under 35 U.S.C. § 103(a) over JP 2001-152134 ("JP-134"). Claims 1-20 are rejected under 35 U.S.C. § 103(a) over U.S. Patent Application Publ. No. US 2003/0124045 ("Kobayashi") in view of U.S. Patent No. 6,740,589 ("Shimazu") and Payne.

The cited prior art fails to suggest the combination of features of independent Claim 1 that (i) the "silica powder has an average primary particle size of from 0.08μm to 0.8μm" and (ii) the "silica powder has a ratio DL/DT of less than 1.3, wherein DL is an average particle size of the silica powder measured by a laser diffraction particle size distribution method and DT is an average primary particle size of the silica powder measured by a TEM photography observation". This combination of features results in good dispersibility and stability in a high purity, low-viscosity slurry, as demonstrated in the specification at Table 1, reproduced below:

Table 1

			Example 1	Example 2	Test Example	Comparison example 1	Comparison example 2	Comparison example 3
Silica Particle	Impurities Amount [ppm]	Na	< 1.0	< 1.0	< 1.0	277	2226	< 1.0
		K	< 1.0	< 1.0	< 1.0	< 10	< 1.0	< 1.0
		S	< 0.1	< 0.1	< 0.1	< 1.0	1200	< 0.1
		Fe	< 0.5	< 0.5	< 0.5	< 1.0	210	< 0.5
		Al	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
		Ni	< 0.1	< 0.1	< 0.1	< 1.0	< 1.0	< 0.1
		Cr	< 0.1	< 0.1	< 0.1	< 1.0	< 1.0	< 0.1
	DL/DT		1.2	1.1	1.2	1.1	1.6(*)	1.5(*)
	Average Primary Particle Size (μm)		0.1	0.15	0.065(*)	0.03(*)	0.25	0.012(*)
Slurry	Silica Concentration (%)		75	80	85	70	70	10
	Viscosity (at the time of preparing) [A]		700	800	880	630	820	>3000
	Viscosity (after one month) [B]		730	850	1620	660	750	>3000
	Viscosity Ratio with Passage of Time [B/A]		1.04	1.06	1.84(*)	0.95	0.91	-

(Note)DL is an average particle size by a laser dispersion type particle size distribution meter, and DT is an average particle DL/DT is the ratio of the average particle size. The unit of the viscosity is [mPa·s]
(*) is outside the range of the preferable range of the present invention

Because the cited prior art fails to suggest all of the limitations of the claimed invention, the prior art rejections should be withdrawn.

In view of the foregoing remarks, Applicants respectfully submit that the application is in condition for allowance. Applicants respectfully request favorable consideration and prompt allowance of the application.

Should the Examiner believe that anything further is necessary in order to place the application in even better condition for allowance, the Examiner is invited to contact Applicants' undersigned attorney at the telephone number listed below.

Respectfully submitted,

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